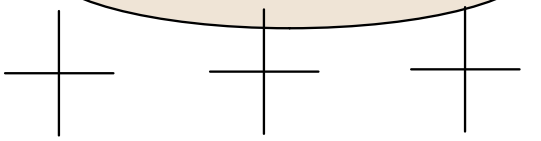
(1.3) Graphically Solving Linear Systems

How to SOLVE **system of equations** by graphing

A **system** of linear equations involves more than one linear equation.

The **solution** to a linear system is the point of intersection of the graphs of the linear equations
The Two equations can be graphed on the same graph to see if they have a solution.
There are THREE possible outcomes.

No Solution …….. The lines never intersect.
One Solution….. The lines intersect once.
Infinite Solutions…. The two equations represent the same line.



Feb 13-11:05 AM

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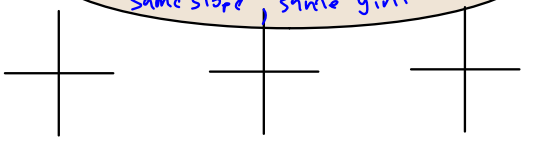
The Two equations can be graphed on the same graph to see if they have a solution.
There are THREE possible outcomes.

No Solution …….. The lines never intersect. parallel
One Solution….. The lines intersect once. different slopes
Infinite Solutions…. The two equations represent the same line.
same slope, same y int



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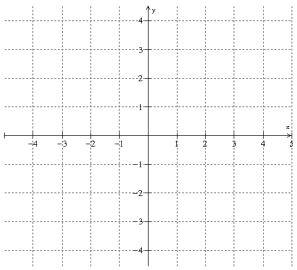
Example: Solve the following linear system.

$y = -2x + 3$ and $-3x + 6y = 3$



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Example: Solve the following linear system.

$y = -2x + 3$ and $-3x + 6y = 3$

$+6y = +3x + 3$

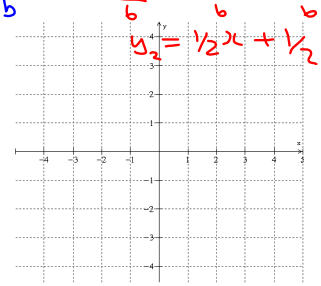
$\frac{6y}{6} = \frac{3x}{6} + \frac{3}{6}$

$y = mx + b$

$b = +3$

$m = -2$

$y_2 = \frac{1}{2}x + \frac{1}{2}$



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$y = -2x + 3$

$y = mx + b$

$b = +3$

$m = -2$

$m = \frac{\Delta y}{\Delta x} \quad \frac{1}{2}$

$y = \frac{1}{2}x + \frac{1}{2}$

$y = mx + b$

$b = \frac{1}{2}$

$m = \frac{1}{2}$

(1, 1)

POI

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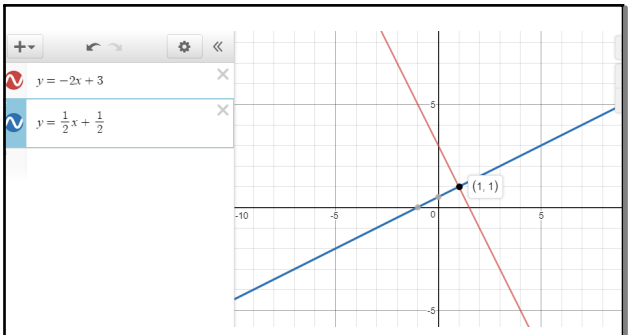

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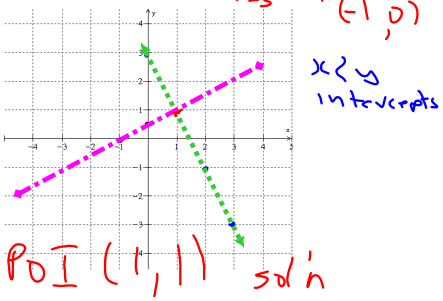

slope
y int
x & y intercepts
POI (1, 1) sol'n

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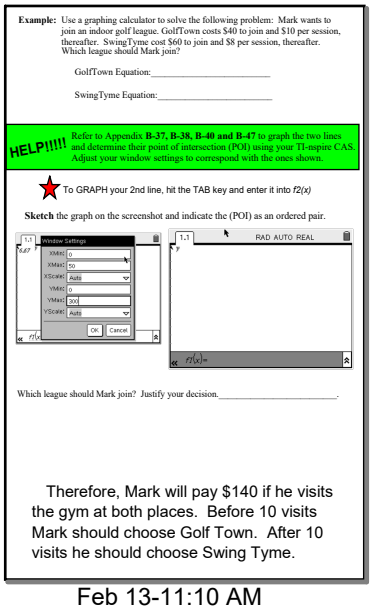

Example: Use a graphing calculator to solve the following problem: Mark wants to join an indoor golf league. GolfTown costs $40 to join and $10 per session, thereafter. SwingTyme cost $60 to join and $8 per session, thereafter. Which league should Mark join?

GolfTown Equation:_____

SwingTyme Equation:_____

HELP!!!!! Refer to Appendix **B-37, B-38, B-40 and B-47** to graph the two lines and determine their point of intersection (POI) using your TI-nspire CAS. Adjust your window settings to correspond with the ones shown.

To GRAPH your 2nd line, hit the TAB key and enter it into *f2(x)*

Sketch the graph on the screenshot and indicate the (POI) as an ordered pair.

Which league should Mark join? Justify your decision._____.

Therefore, Mark will pay $140 if he visits the gym at both places. Before 10 visits Mark should choose Golf Town. After 10 visits he should choose Swing Tyme.

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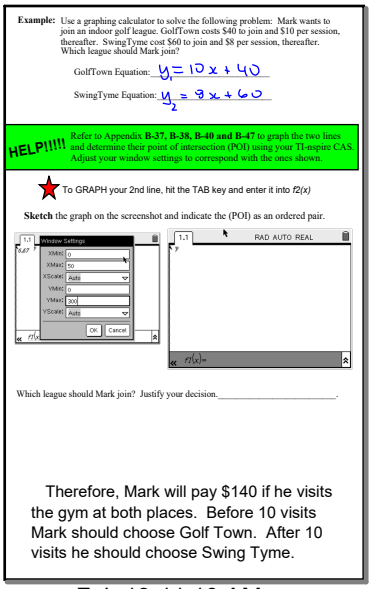

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GolfTown Equation: $y_1 = 10x + 40$

SwingTyme Equation: $y_2 = 8x + 60$

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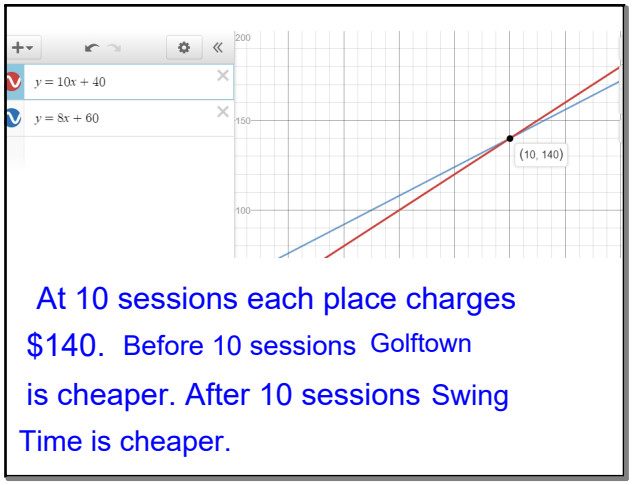

At 10 sessions each place charges $140. Before 10 sessions Golftown is cheaper. After 10 sessions Swing Time is cheaper.

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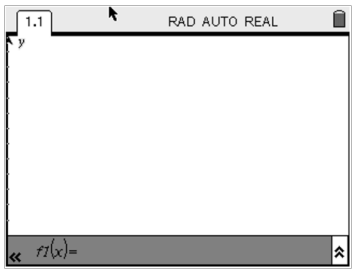
Example: Use a graphing calculator to solve the following problem: Marissa drives 500km between Ottawa and Hamilton. For the first part of the trip on the 401, she travels at 100km/hr. Then, she has to take a detour and travels at 75km/hr for the second part of her trip. The entire trip takes her 6 hours. How long was the detour, in km?



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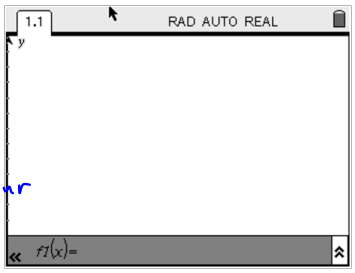
Example: Use a graphing calculator to solve the following problem: Marissa drives 500km between Ottawa and Hamilton. For the first part of the trip on the 401, she travels at 100km/hr. Then, she has to take a detour and travels at 75km/hr for the second part of her trip. The entire trip takes her 6 hours. How long was the detour, in km?

$x + y = 6$

$100x + 75y = 500$

x = time on 401

y = time on detour



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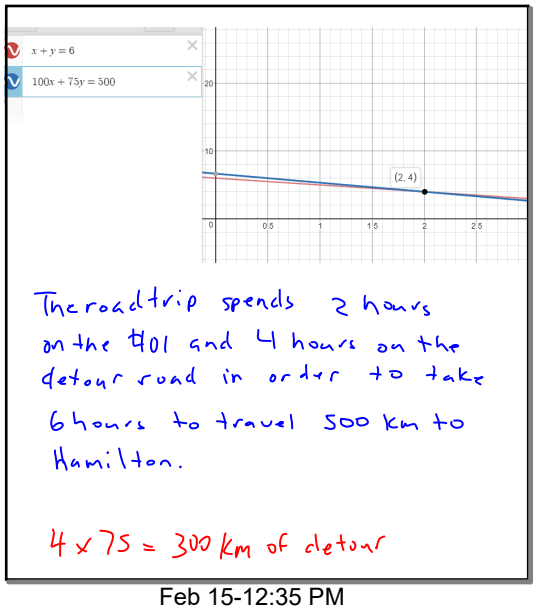

The roadtrip spends 2 hours on the 401 and 4 hours on the detour road in order to take 6 hours to travel 500 km to Hamilton.

4 x 75 = 300 km of detour

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Homework

1.Create a linear system that has no solution. Support with both a graphical and algebraic approach (ie solve by substitution)

2.Create a linear system that has an infinite solution. Support with both a graphical and algebraic approach (ie solve by substitution)

3.Create a linear system that has a unique solution (ie. a single ordered pair). Support with both a graphical and algebraic approach (ie solve by substitution)

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Homework

1.Create a linear system that has no solution. Support with both a graphical and algebraic approach (ie solve by substitution)

$y = 3x + 4$ $y = 3x + 5$

2.Create a linear system that has an infinite solution. Support with both a graphical and algebraic approach (ie solve by substitution)

$y = 3x + 4$ $2y = 6x + 8$

3.Create a linear system that has a unique solution (ie. a single ordered pair). Support with both a graphical and algebraic approach (ie solve by substitution)

$y = 3x + 4$ $y = 2x - 5$

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